ORGANIZATIONAL TECHNIQUES USED FOR WATERSHED MANAGEMENT PROJECTS AND RESULTS OBTAINED

Thesis for the Degree of M. S. MICHIGAN STATE UNIVERSITY Norman J. Brown 1961



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ABSTRACT

ORGANIZATIONAL TECHNIQUES USED FOR WATERSHED MANAGEMENT PROJECTS AND RESULTS OBTAINED

by Norman J. Brown

There has been a growing demand by soil and water conservationists for an effective method of obtaining community action in watershed programs. It is an established fact that, in order to achieve lasting success in a comprehensive conservation program, there must be an acceptance of the program by the majority of the people. As the population continues to grow, making ever increasing demands upon our limited resources, this public acceptance will become progressively more and more difficult to procure. The intent of this study is to outline the step-by-step method used in Michigan watershed projects to secure maximum cooperation, evolved through a process of experimentation and modification during the last decade.

In the involvement process the agencies dealing in soil and water conservation in the area are brought into the program at its inception, through correlation of the various facets of the agency programs with ours, thereby gaining for these

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agencies as large a clientele as possible and allowing limited development funds to be spent on other phases of the watershed work.

The cooperation of the landowners in the watershed area is gained by the organization of a steering committee. The members of this steering committee then initiate and legitimize the project locally, insuring maximum cooperation from the local people.

This dissertation will also present the results effected on the watershed projects, broken down into two categories, tangible and intangible, and indicating the cooperation attainable through utilization of the proper techniques.

ORGANIZATIONAL TECHNIQUES USED FOR WATERSHED MANAGEMENT

PROJECTS AND RESULTS OBTAINED

By

NORMAN J. BROWN

A THESIS

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Lastly, a debt of gratitude to the fine gentleman who first instilled in me the true meaning of the word "Conservation" and one of its very important facets, "Watershed Management" - Mr. O. H. Clark. Mr. Clark is in charge of the Lake and Stream Improvement Section of the Fish Division, Michigan Department of Conservation.

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CHAPTER I

INTRODUCTION

The technical principles of watershed management have been known for many years. The educational and governmental institutions have made great progress in determining the best methods for attacking specific agricultural and engineering problems of water conservation. Perplexities arise, though, in the development of a strategy capable of promoting a comprehensive watershed program to a wide variety of people and interests. There have been many watershed plans advanced, but the few which have been successful are so unusual as to appear curiosities, thus indicating the need for a guide which would give step-by-step procedures for gaining cooperation on a successful watershed program.

This need is further corroborated by the requests for this type of information from the almost continuous flow of visitors to the Michigan Department of Conservation watershed projects. These visiting technicians and dignitaries, representing all areas of Michigan, the northern section of the United States and many foreign countries, have expressed great interest in the process used to gain acceptance of the project by the local people and have even returned with the entire governing board of a particular watershed project in order that the group might

hear this organizational story firsthand. For example, Edward Meadows, Ontario Department of Lands and Forests, came back with the Board of Directors from the Conservancy Watershed to study the methods used by the Michigan Department of Conservation on our watersheds. Therefore, this study will attempt to blueprint the procedure used by the Michigan Department of Conservation in successfully gaining public acceptance of the watershed program. The amount of conservation practices resulting from the program will be used to substantiate the premise that the people did cooperate wholeheartedly, and, in a democracy such as ours, it is the people that make the final decisions as to just how their lands will be used.

Some of the successful programs in the United States should be discussed briefly before examining the watershed program of the Michigan Department of Conservation. Many of these programs pioneered the watershed approach and pointed the way for enlisting the interest, support, participation and criticism of citizens in community watershed organization:

 The Conservancy Districts of Ohio are an example of one of the first attempts by a state agency to inaugurate a watershed program. These districts were established under the original act passed in 1904 by the General Assembly of Ohio, an act empowering a district to levy assessments, condemn land, enter into contracts and cooperate with other agencies on a watershed basis. To stabilize flows, further flood control, accelerate soil and water conservation and purify streams were the end objectives of this watershed program.

The Muskigum Conservancy District¹ is a striking example of the accomplishments possible under this act. This particular project reduced flood damage (\$38,000,000 to date), stabilized stream flows, established the greatest single recreational asset in this section of the United States and created a better land use program on the entire watershed.

To achieve these conservation objectives, the necessary cooperation was procured through a locally initiated and controlled project. After petitioning the Common Pleas Court, the district was established and a three member Board of Citizens appointed to administer the district under the court's jurisdiction. The district is required to hold public hearings on all action which might prove controversial; this, along with other safeguards, prevents the violation of established principles of property rights and home rule.

¹Muskingum River drains 8,000 square miles in central Ohio--Conservancy District was organized in 1933.

The Brandywine Valley Association¹ epitomizes another 2. approach towards solution of watershed problems--a watershed organization established on a non-profit plan rather than a governmental agency acting under state or This association is the best known of the federal act. non-profit corporations administering watershed projects. The goals of this watershed program are embodied in the constitution of the Brandywine Valley Association, Inc. as follows:² "To reduce soil erosion and silting, lessen flood and drought damage, decrease stream pollution, improve and protect existing woodland, reforest marginal lands, and preserve wildlife and natural bounty." These objectives were to be attained through an aggressive, educational and advisory program, financed completely by contributions, and aimed at changing the attitude of the people, thus insuring the success of the necessary conservation program.

The association lists among its accomplishments to date a 95 per cent purification of industrial and sewage wastes, a 60 per cent reduction in silt discharge and a 30 per cent reduction in runoff.

²Brandywine Valley Report, "Adopt an Acre."

¹Brandywine Creek drains 196,000 acres in southeastern Pennsylvania and 14,000 acres in Newcastle County, Delaware.

The local people were brought into the watershed program by the establishment of a thirty member board of directors, elected by the members of the association and responsible for carrying on an active program of interest to every person who lives or works in the valley.

3. The watershed programs of the Michigan and Wisconsin Departments of Conservation are somewhat analagous. The Wisconsin approach to the program is an outgrowth of a stream improvement program and is the primary responsibility of the Fish Division.

Assistance on watershed projects by the Wisconsin Department of Conservation includes basic surveys to determine the need for establishing a watershed project; extent and location of needed remedial practices, such as forestry management (reforestation), protection of waterways (fencing), stream bank stabilization and stream improvement devices.

Cooperation from the principal agencies¹ concerned with soil and water conservation is insured by a memo of understanding drawn up between these agencies and the Wisconsin Department of Conservation, listing the responsibilities of and assistance available from each agency.

¹State Soil Conservation Committee, Soil Conservation Service, University Agricultural Extension Service.

The cooperation of the local people is secured through organization of a watershed association, sponsored by perhaps a soil conservation district or a sportsmen's club. The association officers are elected by the people in each watershed area. The primary objective of the organization is the enlistment of interest and effort of all landowners, organizations and agencies in the area. The major difference in the Wisconsin and Michigan programs appears in the execution stage. Michigan makes a decided effort to complete the construction work on a watershed project in a set period of time, for instance, a threeyear program span; Wisconsin makes no effort to complete a project within a certain time limit, but, instead, works on one parcel of land at a time and may set up demonstration projects on many different watersheds each year. Consequently, numerous watershed projects (over 35) may be in the process of development at any one time in Wisconsin, as compared to a maximum of three in Michigan.

4. Canada's approach to watershed management is illustrated by the Ontario Conservation Authority, a legal governmental agency dedicated to improving land use, reforestation, proper woodlot management and prevention of pollution and control of floods.

The elements essential to successful cooperation in

watershed projects in Ontario are outlined by Mr. A. H. Richardson, Chief Conservation Engineer, Ontario Department of Planning and Development,¹ as follows:

The Authorities which have gone farthest are those in which, prior to the passing of the Act, there was a healthy interest in conservation among the civic leaders, the Press and the people in general. This same interest, spurred on by the fact that they now have power to plan and build in their own community, has been carried over to the Authority in action.

Rapid progress has also been made when the Government of Ontario, at the request of the Authority, has appointed a secretary-manager to direct and co-ordinate its work. It is difficult to progress rapidly over such a large area if men who are engaged primarily in making a living must find time to plan and carry out, even to a limited degree, the broad program of conservation which the whole watershed demands.

Also, those Authorities which when carrying out a diversified program are in the healthiest condition. Such a program envisages something for all--the man in the city, the farmer, the small town dweller and the schoolchildren.

Public relations in all its forms is very important to success, but here again, with the modern facilities of radio, visual aids, literature and the press, the full-time manager is essential.

Other watershed projects might be outlined here, but it is not the author's intent to give a summation of all successful watershed projects, but rather to mention those projects viewed in action and where the author has also had the pleasure

¹Excerpts from a speech given by Mr. Richardson at the Soil Conservation Society of America, Buffalo, New York, 1952.

of talking with the persons responsible for the success of these watersheds.

There appear to be many different approaches for securing the cooperation of the people, dependent on the inherent customs of the area and the legal framework used in setting up the project, but all of the successful projects reviewed made a major effort to win the support of everyone concerned.

CHAPTER II

BACKGROUND OF MICHIGAN'S WATERSHED PROGRAM

The Michigan watershed program is the result of early pioneering by Mr. O. H. Clark, at present in charge of Michigan's Lake and Stream Improvement Section of the Fish Division, Michigan Department of Conservation. Mr. Clark, from the very beginning of the Department of Conservation's effort in stream improvement, insisted that the sound foundation for habitat development should be on a complete watershed basis. This concept was endorsed by the Michigan Department of Conservation and the Michigan Legislature and the Rifle River was selected as the initial project.

The very act which created the Department of Conservation also gave this agency the authority to develop watershed projects.¹ Section 3 of the act reads, "It is hereby made the duty of the Conservation Department to protect and conserve the natural resources of the State of Michigan." Watershed projects are one method of accomplishing this goal and the State Legislature, by authorizing appropriations for watershed work, has recognized the function of the Department of Conservation in this field.

Act creating Department of Conservation - Act 17, Public Acts 1921.

In the spring of 1950 the Michigan Department of Conservation inaugurated a watershed development program on a comprehensive land-use basis. It was deemed essential at the very beginning to provide a method by which maximum cooperation could be obtained from the entire watershed community. This dissertation will be concerned with the methods used in procuring maximum cooperation in these watershed projects and some of the measurable or tangible results, as well as a few of the intangible results.

The basic philosophy was established at the inception of the projects, i.e., "The watershed program is based on the principle that the quality of a trout stream is determined by the conditions of the watershed. Since streams are the result of precipitation over the entire watershed area, unhealthy watersheds will result in trout streams of low productive levels."¹ To substantiate this philosophy, we need only to examine some of the destructive agents of trout habitat. The continual addition of the products of erosion, in the form of bedload and suspended silt, fills in the pools and escape cover, changes the bottom from productive to less productive types and destroys spawning areas by a covering of fine material. Damaging effects of this

¹W. H. Tody, O. H. Clark, Michigan's Rifle River Program. Reprinted from transactions of the Seventh North American Wildlife Conference, March 5, 6, 7, 1951.

type of pollution are summarized as follows: "These wastes when added to streams fill pools, cover rich food-producing areas with barren materials, destroy cover and plant beds, increase turbidity and decrease productivity, and in extreme instances completely fill the channel and obliterate flow or convert the stream into a shallow meandering sheet of water largely devoid of fish and insect life."¹ The destruction of stream-side shade and the widening and shoaling of stream channels have a warming effect on the stream temperatures, tending to raise them above the optimum range for trout.

Another important destructive agent is the reduction of low flows, and the increase in maximum flows, brought about by adverse conditions in the watershed. This is a needless loss of vast quantities of water during the spring floods, which would be valuable if added to the ground water resource for additional stream flow during the critical low water months. In many streams this is the limiting factor in trout production.

The first watershed project undertaken was the Rifle River in Ogemaw County, in 1950. From this beginning the program has been extended to include the Pine River in Osceola, Lake, Wexford and Manistee Counties, the Cedar River in Clare and

¹R. W. Eschmeyer, American Forestry Series, Volume II -Wildlife Management, R.E. Trippensee. McGraw Hill Book Co., 1955, p. 377.

Gladwin Counties, the White River in Newaygo County, the Maple River in Emmett County, the Manistee River in Antrim, Otsego, Crawford and Kalkaska Counties, the Platte River in Grand Traverse and Benzie Counties, Pine Creek in Dickinson County, the Little Manistee in Lake, Mason and Manistee Counties, the Sturgeon River in Otsego and Cheboygan Counties and the Sucker River in Alger and Schoolcraft Counties. The Little Manistee, Sturgeon and Sucker Rivers are yet in the construction phase. Incidentally, nine of these projects are located in the northern Lower Peninsula of Michigan and two in the Upper Peninsula.

Geologically, the areas included in the watershed projects consist of high, hilly moraines on the peripheries with extensive outwash plains adjacent to the rivers. The soils are extremely diverse, ranging from light sands to heavy clays. The sands and sandy loams are the dominant soil types.

The annual precipitation varies from 28 to 32 inches with approximately 16 inches occurring between April 1st and September 30th. The frost-free growing season ranges from 90 days in the interior to 120 days along the Great Lakes. Cold winters and moderately heavy accumulations of snow are common.

The land use is largely dependent on local soil conditions. Where the soils are more productive, farming is intensive and on a permanent basis. On the lighter soils the farms are usually small with many tenant farmers and absentee owners.

The forest cover within the project areas ranges from a minimum of 50 per cent of the entire watershed to a maximum of 75 per cent on the most heavily wooded watershed. The forest types are typical of the northern lake states, consisting, except for the Pine watershed, of second growth, uneven-aged stands resulting from natural reproduction and selective cutting following the original logging operations.

Recreation and resort activity account for a large part of the land use. Hunting and fishing are great tourist attractions and many resort cabins have been constructed along the streams and lakes.

Public ownership is either under federal or state jurisdiction, depending on location of the watershed. It comprises approximately 20 per cent of the total land area. The remaining 80 per cent is in private ownership and about equally divided between farm land, forest land and recreation land. Human settlement on the watersheds is sparse. The towns are small, ranging from 300 to 500 in population and they depend on resort trade for an appreciable part of their income. The rural settlement is concentrated on the better soils with farming, wood work and employment in town providing needed income. The watershed projects are financed from two sources: (1) the Game and Fish Protection Fund, which derives its money from license fees and provides approximately 25 per cent of the total; (2) the Dingell-Johnson Fund, which provides the remainder of the finances. The Dingell-Johnson Fund¹ is derived from a 10 per cent federal tax on fishing tackle, which is returned to the state, based on a formula using the number of fishing licenses sold as a basic factor.

The costs on each project ranged between \$1.00 and \$1.50 per acre. For example, the Pine River watershed drains 150,000 acres and cost \$160,000. The Cedar River watershed drains 80,000 acres and cost \$120,000.

As stated previously, the program, to be successful, must concern itself with the condition of the entire watershed. Mr. Edminister sums up the problem very well:

Complete renovation of a watershed is a huge job. It is not the job of any single agency or branch of government. It cannot be done with a "let John do it" attitude. It will take great ingenuity of organization, and no little cost, to see it through. Yet it must be done. From the valley bottom to the top of the highest hill, it demands the application of our highest skills of technology and social cooperation. By working together to the common end, all of us, we will meet that challenge successfully, and we and our posterity shall be the benefactors.²

¹Public Law 681, 81st Congress, "An act to provide that the United States shall aid the States in fish restoration and management projects, and for other purposes."

²Frank C. Edminister, 1948 Watershed-Horizon of the River Valley. Trans. 13th North American Wildlife Conference, pp. 101-106.

In order to initiate a conservation program on the entire drainage area of a stream, it must have the whole-hearted support of many groups of people. People own the land and control the water where the major construction work will be carried on. People continue to use destructive practices unless they are presented with the proper informational program. People pay for the program through licenses or taxes. These people become the key to success or failure of the program.

Before the methods of obtaining cooperation are outlined, the obstacles to cooperation peculiar to these projects should be mentioned. The order of listing these problems does not reflect upon their importance, which varies considerably from watershed to watershed:

a. The first adverse condition results from the rather large amount of land owned, and consequently, water access controlled, by disinterested persons to whom hunting and fishing as sports are of little import. They profess to have little desire to improve habitat for wildlife species. This group of people might consider the program undesirable because it would tend to invite the use of their area by sportsmen.

- b. Paralleling this group is the absentee owner group, also controlling land and water area and presenting a different problem. This group has very few affiliations with local social organizations. Local planning groups are frequently tempted to ignore this group altogether, because of the difficulties encountered in attempting to contact them, but this cannot be done because they control about one-third of the land.
- c. The third obstacle to local cooperation involves the method of financing. The involvement of a state agency in the program creates a barrier to aggregate action on the part of some local people. The rural attitude of taking care of problems on the local level is very strong. It is so often heard that "We don't need any help from Lansing to solve our problems."
- d. The increasing competition among users of land and water has caused some difficulty in implementing watershed projects. Some portions of our streams' sources have been subdivided to the extent that the enjoyment of the stream for fishing has been nullified, regardless of the fish population in the stream.

The final barrier to cooperation in watershed proe. jects is the conflicting programs presented by various agencies as panaceas for conservation prob-It is difficult to explain desirable features lems. of an agency's program, for example, cost sharing, reforestation and retirement of agricultural land, when at the same time production is being increased by a direct subsidy in the form of cost sharing for lime and fertilizer. It is confusing for the private landowner to have one agency encourage him to save his wetland for wildlife and water storage and another agency furnish him with technical assistance for draining the marsh and still another agency furnish him with a large percentage of the cost involved in the drainage project.

Sometimes sound conservation programs, such as deer herd management or law enforcement, alienate certain citizens against all conservation oriented programs. This presents a problem at times, but can be overcome by taking a firm stand in support of the programs. Even though these people are opposed to what is said, they will respect the right to free speech, if said convincingly enough.

CHAPTER III

METHODS OF SECURING MAXIMUM COOPERATION

After a watershed has been chosen by the division staff for special consideration, the surveys are completed, with the resultant survey and plans report. For each watershed project this report is an inventory of the conditions present, the problems and their solutions, and costs. The report is the basis for the work project on the river. This survey and plans report is just so many words and figures until put into practice on the land. The implementation of this plan requires the assistance of all the agencies dealing with water resources, plus the support of a great majority of the local citizens.

The assistance of the agencies within the project can be insured by having a watershed plan which includes an active program for each agency. The plan should clearly describe the need for increased action by each agency in the particular field. To cite an example--if there is a need for a reforestation program, the plan should state this and then give in some detail the manner in which each agency might cooperate to accomplish this common goal. The sponsoring agency must be willing and able to spearhead a promotional program in order to acquaint the landowners with the necessity of participation in existing conservation programs. Often, programs which

would be beneficial to many landowners are used by only a relatively few of the more aggressive landowners, for example, the conservation payment program. This can best be corrected by carrying on an informational program which reaches the entire local population.

The cooperative attitude of an agency may be easily maintained or improved by public recognition of its accomplishments in the program. This is the life blood that stimulates the employee or volunteer worker into doing more than is directly required of him.

These recommendations are the generalized ground rules which apply to all the governmental agencies involved in the watershed program. There are specific recommendations applicable to the major cooperative agencies which will be brought out next in this report.

The Soil Conservation Service, working in conjunction with the local soil conservation districts, assists landowners in establishing complete soil and water conservation plans for their farms or ranches. The Soil Conservation Service also furnishes the necessary technical assistance for installing the soil practices needed in the establishment of conservation farm plans. This program has a direct effect in the control of the amount of soil and water losses from the privately owned land in the watershed. Because this is essential in the The following maps contain graphic data found in the Surveys and Plans Report.



DIVISION OF FARM AND FOREST DISTRICTS UPPER WHITE RIVER WATERSHED



OVERGRAZED AREAS ALONG THE STREAMS UPPER WHITE RIVER WATERSHED



OVERGRAZED AREAS ALONG THE STREAMS UPPER WHITE RIVER WATERSHED



OVERGRAZED AREAS ALONG THE STREAMS UPPER WHITE RIVER WATERSHED














attainment of the goals set up by a watershed project, this agency's activity should be encouraged to the utmost.

The original survey should contain the current accomplishments in terms of the number of district cooperators, basic farm plans and conservation practices installed. The survey should also determine the amount of work needed in these three categories to complete the improvement program. With these data the Soil Conservation District Board and Soil Conservation Service personnel can be contacted and after a joint meeting a plan of action can be decided upon. This plan of action will take into consideration the areas where the soil conservation program needs acceleration and the assistance needed to give impetus to the program. In all of the watersheds the basic conservation plans are the ultimate goal on In order to develop a basic farm plan, there must the land. first be an agreement signed by the landowner, requesting the soil conservation district's aid. The Department of Conservation, through its promotional activity in each project, has been able to stimulate the initial sign-up of cooperators, which is the beginning point of the final basic plan.

There have been practices such as reforestation and waterway impoundments for which the Soil Conservation District Board has requested additional help. In these cases the Department of Conservation has been able to expedite the application rate.

This increased rate of application is reported as a direct result of the watershed program. An example of one method used would be the increase in reforestation on the Pine River watershed. The original surveys indicated a need for 15,000 acres of reforestation. The application rate prior to commencement of the project in 1952 was 15 acres per year. Α meeting was held with the Soil Conservation Service personnel and the Soil Conservation District Boards involved in the project and a plan was implemented to increase this rate of reforestation by making nursery stock and planting machines readily available to landowners in the watershed. The Conservation Department was able to reserve planting stock at its own nursery so that trees would be available for the proposed reforestation schedule. Order blanks and instructions for filling the blanks out were placed in the local business establishments within the watershed. Tree planting machines were made available to the Soil Conservation District Boards, to be rented to cooperators in the watershed. As an additional incentive, the trees were trucked free of charge from the nursery to the community building in the center of the watershed. Then, if a landowner wanted trees, he could purchase them with the same ease as he could buy a package of breakfast cereal. He was assured of receiving the species and amounts of stock he had ordered and during the proper season for

planting. This relatively small amount of additional promotional work increased the tree planting acreage from 15 acres prior to the project to 1,000 acres the second year of the project.

The Agricultural Stabilization and Conservation Program has two separate components which directly affect a watershed program, namely:

- The direct payment for the installation of soil and water practices on privately owned land.
- The Conservation Reserve, which makes a yearly cash payment to farmers for keeping cropland under permanent cover.

The direct payment program has accelerated the establishment of soil conservation practices within the watersheds. This is quite noticeable in the reforestation practices. Now 75 per cent of the tree planting within the watersheds is carried out under the Agricultural Conservation Program.

The Conservation Reserve and Soil Bank Program have stimulated the removal of cropland from normal farm use to permanent forest vegetation. This practice should eventually reduce the sedimentation damage to the stream from this land.

To make sure that the watershed project derives the full benefit from this program, a working arrangement must be resolved with the local county committee, the office manager and the field man. This is usually completed at the county committee's regular meeting. At this meeting the arrangements can be worked out to include needed practices in future programs and the acceleration of the present practices which are applicable to the overall watershed program. The next step is to contact individually, or by mail, each landowner that needs these practices on his land and explain to him the amount of financial assistance available and the necessary procedure for receiving this aid.

The Conservation Reserve program was used to control areas of excessive erosion and stretches of stream being damaged by livestock. Each farm to which the above conditions were applicable received a letter explaining fully the Conservation Reserve Program and giving the progressive steps for the farmer to follow to qualify for this program. Nearly 10 per cent of the farmers contacted placed land under this program during the first year.

The Extension Service is the field representative of Michigan State University. As such, it is the link between the citizens of a county and the facilities of this great university. It is a wise policy to contact the personnel of the Extension Service at the very beginning. Their assistance is valuable in giving the project the proper publicity at the local level. The Extension Service has access to radio, television and other mass communication media, saving time and effort normally required to procure all these contacts individually, and personally. The Extension Service can also provide needed sociological background information concerning the community leaders, ethnic groups, religion, customs and other details inherent to the area. This type of information, gathered before any contacts are made with the people, may prevent many embarrassing situations.

The United States Forest Service administers all of the federal land in our present watershed projects. Most of the land was abandoned land, subject to severe wind and water erosion. Through a program of fire suppression and reforestation, this land has been restored to forest cover. In isolated cases where the surveys show the need for reforestation or prevention of grazing damage on United States Forest Service lands, the forest ranger in charge of that particular forest is In every instance, the corrective measures were put contacted. into effect after this initial meeting. The United States Forest Service has also been a major contributor of timber used in the construction phase of the project. These materials are furnished free of charge from nearby areas.

The County Road Commission differs from the above organization in that it is controlled entirely on a county basis. The road commission has jurisdiction over the entire road system of a county, excluding the limited amount of federal and state highways. Before the road commission is contacted, the entire road system in the watershed must be surveyed. This survey will determine the extent and location of road ditches needing repair and the possible repair methods.¹ With this survey as a basis for a repair program, the County Road Commission is contacted at their regular meeting. The survey is carefully reviewed and a repair program worked out. Each county will be different, because of varied interests, finances, know-how, etc. An attempt is made to plan a repair program which will stabilize an appreciable percentage of the eroded ditches each year. Because the commissions may change with each election, this contact must be renewed at regular intervals until the goal has been achieved.

The five agencies listed above are the major cooperators in a land use program. There are others, such as the United States Geological Survey, which provide assistance in gaging stream flow; the Weather Bureau, which was instrumental in setting up a weather station on the original watershed (Rifle River) and school boards, which have donated use of buildings for meetings.

¹Erosion from road ditches contributes a significant amount of sediment to streams as shown by a sedimentation study "Road Erosion in Lake County," 1951, made by the Soil Conservation Service on the Pine River watershed.

Experience has shown that liaison work must be done on an entirely individual agency basis. Originally, the agencies were all invited to meet together in order to develop an action plan for the watershed program. However, the meeting did not accomplish this goal. Instead, the group became a captive audience for each agency representative's lengthy dissertation on just how the said agency could be expanded with more funds. This is in direct contrast to the normal public attitude which demands more and better work for less money. The standard practice is to work with the people in their existing social organizations. This is even carried one step further by creating a new organization called a steering committee to represent the people within the watershed and assist in solving the problems of the watershed projects.

This steering committee is organized by meeting with each representative group in the watershed. This is usually a regularly scheduled winter meeting of the organization, at which the proposed watershed project is explained and the need for cooperation is carefully emphasized. The organization is asked to select one member to serve on the steering committee. The members of the group give considerable thought to the choice of this person. After a round of discussion concerning the qualifications of several of the members, one of the leaders is selected. This individual becomes the contact between the project and the organization from this time forward. A partial list of organizations which have had a representative on past steering committees includes the Soil Conservation District, Farm Bureau, Grange, sportsmen's clubs, chamber of commerce, lake and stream improvement associations and the village council. The total membership of the steering committees is usually between twelve and twenty members.

The steering committee is given the overall duty of gaining public acceptance of the watershed program. The first step is to make certain that the committee understands and approves of the survey and plans report. The committee, as soon as possible after completion of the selection of members, is called together for a meeting, preferably in the winter offseason, in order to insure good attendance. The survey and plans report is introduced, questions are encouraged and the problems are discussed. After the plans have received the approval of the committee, either as written or as modified, the committee is then asked to assist in transforming the many symbols on the paper to installed conservation practices in the field. The group is most enthusiastic in helping out in every way possible to accomplish this end. A community leader remains a leader only as long as he supports successful programs.

In order to maximize the effect of community leader approval, it is essential to acquaint as many people as possible with the fact that these particular individuals are supporting the program. This is the stage at which the cooperation of the Extension Service and their news media becomes most effective. Another way to make sure that people are cognizant of the steering committee backing is to send a letter to every landowner in the watershed. The purpose of this letter is to invite everyone to a general rally, to be held at some centrally located public hall. This letter has an hidden purpose-to acquaint everyone with the steering committee. To effect this, the steering committee does the inviting and signs the letter; a message from the director of the Department of Conservation is also enclosed which fully explains the objectives of the project.

The steering committee is introduced to the people at the rally. After introductions and a few short speeches, a colored slide program is offered, consisting of before and after pictures taken of previous watershed projects. After the slides, a question and answer period is conducted and a general feeling of harmony is established.

As soon as the work has progressed far enough to have some actual substance, the steering committee is taken on a field trip to inspect the completed work and review the problem areas.

This instills a sense of accomplishment in each committee member and keeps them keenly interested in the project.

The following winter the committee is given a progress report on the total project, at a meeting usually scheduled early in January. The meeting provides the opportune time for airing various problems which must be solved if the project is to be successful, such items as new signers, habitual complainers, etc. Also, action programs could be planned, if desirable, for encouraging the establishment of specific conservation practices. For instance, at one of these meetings it was decided to place nursery order blanks in the stores to accelerate tree planting; the chamber of commerce representative took complete charge of selecting the stores and gaining the cooperation of the owners and clerks in filling out the necessary blanks for the landowners. The progress report given at this meeting becomes the basis for a report which each member of the steering committee makes to his parent organization annually. This keeps each social organization informed on the project and saves the technicians from time consuming meetings with each organization each year. These winter meetings and summer field trips are carried on until the completion of the construction phase of the project. The summer field trips also include reporters and editors, thereby adding considerable prestige to the steering committee.

The steering committee is used to set up the neighborhood groups of two to twelve landowners. Each member takes the area he represents and invites in his friends and neighbors to a meeting at his home or a local community building. At these neighborhood group meetings the program for that section of watershed is discussed in great detail. Maps of the individual sections of stream or land are used to explain the work and to show the exact locations of any or all of the improvement work.

The agreements which give the Michigan Department of Conservation agents permission to go upon the private land in order to do the necessary construction work are signed at this meeting. It has been found much easier and faster to get these agreements signed in a group rather than individually.

This meeting also serves as the ideal place to explain the programs of the other agencies which apply to this minute section of the total watershed area. The landowners are then encouraged to take advantage of these programs and any forms which should be filled out in conjunction with these programs are completed at this time.

There still remain a large number of individuals who cannot be worked into group meetings and must be contacted individually, either due to absentee residence or perhaps



FIGURE 1. Group meeting to acquaint landowners with the overall program--Cedar River Watershed.



Figure 2. Group visiting one of the watershed projects--Cedar River Watershed.

incompatibility with the organized groups. If these persons are local residents, they are contacted individually, the program is explained to them and the necessary signature is obtained on the agreement. One difficulty arises when doing this contact work--an attempt on the part of the landowner to draw the planner into neighborhood or family feuds, by avowing that unfair treatment has been received because a meeting was held at a neighbor's house and he did not receive an invitation, or that there are specific differences of opinion covering certain points of the program. The Conservation Department representative must avoid taking sides, but, by exerting patience and tact, he can usually overcome this bitterness.

The absentee owner presents a unique problem, as he must, in most cases, be contacted by mail. The initial letter must explain fully what the plans for his land are and yet be short enough so that he will read it. Also enclosed with the letter should be the agreement, to be signed and returned. Incidentally, on one of our watershed projects we have received an 80 per cent positive return from this contact by mail. When an answer is not forthcoming, a check is made for accuracy of address and present ownership and a follow-up letter is forwarded, offering to meet with the individual on his property at his convenience, to explain the program.

This usually accomplished our purpose, except for estate property and property having legal barriers. The absentee owner must also be consulted when we wish to install a major conservation practice, for example, reforestation. We effect this by using the surveys to determine each parcel of land needing tree planting and then by writing to the absentee owner individually. This letter must be worded in such a way as to take a positive approach, stating the need for reforestation and explaining the method of obtaining stock, assistance, etc. We were able to obtain a satisfactory response and to develop a large plantation program with the absentee owner. Of course, much valuable assistance is given by the steering committee with these absentee owners. The steering committee member is a local resident, available on week ends when the absentee owner is in the vicinity and able to answer most of the questions the owner could ask, thus maintaining a vital contact with him.

CHAPTER IV

RESULTS OBTAINED BY MAXIMUM COOPERATION

The evaluation of the watershed program will be restricted to the accomplishments resulting from the cooperation given to our projects by the informed citizens of the various watersheds.

For example, the number of fish habitat structures installed as a part of each watershed project are a measurable result of this cooperation, for permission to build the structures on the stream frontage has to be granted by each individual landowner. The determination of benefits obtained from the structures in terms of additional fish in the fisherman's creel will be entrusted to other studies being carried on by trained fisheries biologists.

Gaining access to privately owned units where construction work is planned is a necessary and major goal and is accomplished by the signing of an agreement between the landowner and the Michigan Department of Conservation. This agreement gives the Department of Conservation personnel permission to enter upon private lands and to construct any fish habitat structures deemed advisable. The owner's signature is needed before any of the planned work can be installed in the stream.

Agreements have been signed by an aggregate average of 97 per cent of the private owners. On one watershed (Pine Creek

in the Upper Peninsula) a 100 per cent signup was obtained. Those who do not sign often have an underlying reason, such as limited education, strong ties with ethnic groups or extreme individualism. This high percentage of cooperation has been secured without the use, or threat of the use, of the State's power of eminent domain. The author has been unable to discover any other governmental project that has gained this degree of cooperation.

Through this cooperation, the Department of Conservation was able to install 7,764 habitat improvement structures directly in the stream channel, for the purpose of stabilizing the shifting sand bottom and adding cover for the trout, especially the larger specimens. Then, too, as a result of the sign-up by property owners, the Department of Conservation repaired gullies which required a major improvement structure. These gully repairs were beyond the means of the private landowners and consisted of check dams and cut-off walls in the gully proper and large earth impoundments in the gully head. Incidentally, all gullies classified for remedial work were repaired.

Another important facet of stream improvement work is the fencing done along the stream channels, to restore streamside shade and to protect the stream banks from erosion. Fencing is constructed only on land where permission has been first granted by means of a signed agreement. The fencing has to be staked out with the farm owner and must comply with the farmer's wishes as well as protect the stream. A total of 31 miles of fencing has been constructed on all the watershed projects, the largest intermittent stretch of fencing being the 14 miles on the Cedar River.

The stabilization of eroding stream banks requires a major developmental effort on all of the watershed projects. The accessible eroding banks are repaired by grading, if needed, to the angle of repose, protection at the toe with riprap and sodding or seeding on the face. Stumps or other material are used to stabilize banks that are inaccessible to heavy equipment, or where rocks are not available in the vicinity. To haul the rock used to repair the 63,526 feet of bank would have required a continuous line of trucks with four-yard capacity stretched from Lansing to Houghton Lake, a distance of 120 miles. These rocks were not only installed on stream banks owned by private individuals, but, in many instances, they were also collected from farm fields and trucked across private land to the stream. During these operations the field crews have had such misfortunes as crashing through septic tanks, disrupting flower gardens and overloading home-made bridges, but in all cases they were permitted to continue the work after completing the necessary

TABLE I

AGREEMENTS SIGNED ON COMPLETED WATERSHED PROJECTS

Project	Agreements signed	Number refused	Per cent signed
Rifle River	96	1	9 9
Pine River	102	1	99
Cedar River	97	5	95
Maple River	23	2	91
Pine Creek	37	0	100
White River	63	1	98
Platte River	68	1	99
Little Maniste River	e 167	1	99
Big Manistee River	_112	0	100
Total	765	12	98

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FIGURE 3. Stream improvement device--Little Manistee Watershed Project.



FIGURE 4. Stream improvement device--Little Manistee Watershed Project.

repairs. The majority of the 32,931 feet of banks repaired by wood structures were located on the Little Manistee and Manistee watersheds. The area drained by these rivers is devoid of rocks, making the use of wood necessary in order to keep the cost of the bank stabilization within the scope of the project. Fortunately, these rivers have a very stable flow which limits flood damage.

The establishment of soil conservation practices was carried out in conjunction with the Soil Conservation District program. The Department of Conservation publicized the Soil Conservation District's program in order to effect an increased sign-up with the farmers in the watershed. This promotional program resulted in an increased demand for assistance from the Soil Conservation District and led to the establishment of 356 basic farm plans on the farms within the watersheds. The basic farm plan is an essential instrument for implementing the needed conservation practices on the land. On the watershed projects the rate of application has doubled as compared to soil conservation practices in effect prior to the commencement of the projects.

The Department of Conservation, as part of the watershed program, focused its attention particularly on one of the conservation practices, reforestation. Reforestation for the purpose of erosion control and shade along the stream channels

TABLE II

Project	Log jams	Other covers	Deflectors
			······
Rifle River	29	79	39
Pine River	347	223	5
Cedar River	175	822	249
Maple River	268	286	620
Pine Creek	35	83	174
White River	630	154	123
Platte River	244	263	5
Little Manistee River	1232	525	106
Big Manistee River	565	386	97
Total	3525	2821	1418

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FISH HABITAT IMPROVEMENT STRUCTURES



FIGURE 5. Eroding stream bank--Rifle River Watershed.



FIGURE 6. Same bank after repairing with rock riprap.

TABLE III

Rock Wood Total Project Stabilization Stabilization Rifle River 9,650 feet 182 feet 9,832 feet 9,542 " н 11 Pine River 527 10,069 11 11 Cedar River 13,150 3,215 ... 16,365 н 11 \mathbf{n} Maple River 1,652 15,936 14,284 н 11 Pine Creek 6,078 2,110 ... 8,188 White River 7,762 н 345 н 8,107 н 11 11 н Platte River 625 200 825 2,435 " 2,700 " 11 Little Manistee 5,135 River Big Manistee 22,000 н 22,000 11 _ River Total 63,526 feet 32,931 feet 96,457 feet

STABILIZATION OF STREAM BANKS--COMPLETED PROJECTS

TABLE IV

FENCING CONSTRUCTED

Project	Amount Constructed
Rifle River	2,007 rods
Pine River	2,040 "
Cedar River	4,427 "
Maple River	48 "
Pine Creek	1,224 "
White River	231 ".
Little Manistee River	140 "

Total 10,117 rods (31 miles)



FIGURE 7. Eroding gully--Pine River Watershed.



FIGURE 8. Same gully after repair--Pine River Watershed.

was given first priority and the costs were borne by the Department of Conservation. The landowner signed an agreement which restricted him from cutting or pasturing these trees for a period of 10 years. One thousand and seventytwo (1,072) acres were planted in this category. The reforestation needed on the other areas of the watersheds, as discussed earlier in this report, was accomplished through contact with the landowners by mail, mass media or individual appointment. They were informed of the many benefits obtainable from the establishment of forest cover on bare, eroding soils and they were also notified of the order plan for Department of Conservation nursery stock. This program resulted in the planting of 8,112 acres of privately owned lands to pine trees. This does not include the planting carried on by the public agencies on their lands in the watersheds.

The secondary road erosion control is carried out by the County Road Commission of each county within the watershed areas. All eroding road ditches in the Little Manistee and White River projects have been brought under control, and the ditches on the other projects are being repaired at a planned rate of one or two ditches each year. This should lead to complete control of all eroding road ditches on all projects at a future date.



FIGURE 9. Crew reforesting the eroding area along the stream--Pine River Watershed.



FIGURE 10. Same area as above showing the recovery after reforestation--Pine River Watershed.

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TABLE	

AMOUNT OF SOIL AND WATER CONSERVATION PRACTICES INSTALLED ON PROJECTS

River*	Basic farm plans	Refor- estation (in acres)	Diversions and water- ways (in miles)	Strip crop- ping (in acres)	Pasture improve- ment (in acres)	Woodland manage- ment (in acres)	Ponds
Rifle	46	510	14	103	147	170	13,
White	104	1652	7	1198	400	260	თ
Pine	110	4311	13	1061	498	370	TT
Pine Creek	41	72	თ	725	281	117	თ
Little Manistee	14	915	l	20	30	20	m
Cedar	37	652	4	71	233	257	4
Totals	352	8112	48	3178	1589	1194	49

*The only watersheds that have these data available.



FIGURE 11. A section of the stream being reforested immediately after fencing--Pine River Watershed.



FIGURE 12. Same section of the stream as above, showing the vegetative growth as the result of fencing--Pine River Watershed.

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TABLE	

SUMMARY OF LAND USE CHANGES 1952 TO 1958

Land use in acres	1952	1958	Per cent change	Acreage change
Cropland	27,528 acres	20,420 acres	-26	7,108 acres
Pasture	21,050 "	11,040 "	-48	" 010,01
Recreational	9,800 "	21,765 "	+122	11,965 "
Forest	91,072 "	96,225 "	+6	5,153 "
Misc. (town & lakes)	630 "	630	ı	I
Totals	150,080 acres	150,080 acres		

TABLE VIII

CHANGES IN FOREST MANAGEMENT

	1952	1958	Per cent change	Acreage change
Grazed woodlots	24,116 acres	11,589 acres	-52	12,527 acres
Ungrazed woodlots	52,529 "	65,056 "	+24	12,527 "
Pine plantations	14,427 "	19,580 "	+36	5,153 "
Totals	91,072 acres	96,225 acres		

Many beneficial changes in land use have been accomplished as a result of these watershed changes. To determine the extent of these land use changes, a survey was made of the Pine River watershed six years after the inauguration of the program. The following revisions were especially noteworthy:

- There was a marked decrease in cropland (-26%) and permanent pasture (-48%) and a corresponding increase in recreational (+122%) and forest land (+6%). A land use change of this magnitude should reduce the sedimentation and flood peaks on the stream.
- 2. Grazing on approximately one-half of the woodlots had been discontinued at the end of the six-year period.

If the intangible results of the watershed program could be catalogued with the same ease as the tangible results, it would indeed make an impressive list. This, of course, is impossible to do, but an attempt will be made to give a few examples of these intangible accomplishments.

The organizations which gave support to the watershed programs and had steering committee representatives gained intrinsically through increased membership, activity and interest, accrued from involvement in a successful program. The Tustin Sportsmen's Club will illustrate this point: At the time the steering committee was organized on the Pine River, the club was quite inactive and had only ten members.



FIGURE 13. Stream damaged from heavy grazing--Pine River Watershed.



FIGURE 14. Same area as above after the elimination of grazing damage--Pine River Watershed.
As a result of the stimulus supplied by the project, the club developed new life and now has a membership of nearly 200; it has a cooperative attitude towards all conservation programs, regardless of popularity; the club has been in favor of antlerless deer seasons since 1952 and has taken the lead in promoting this necessary program; the club delayed road construction work on a stream crossing until the needed erosion control steps were taken. This is just one of over 100 organizations contacted in the setting up of these watershed projects--all have been stimulated to a varying degree.

The watershed projects have increased land values in the various areas. The active farms which established the needed soil conservation practices have benefited directly by increased income. The communities have gained indirectly through farms, where formerly eroding conditions existed, now made productive for future use by retention of topsoil.

Recreationists migrate to an area because of a combination of many factors, such as clear streams, forested hill sides and the positive attitude of the local people. In all of these points, the projects have had a beneficial effect.

The direct benefits in returns to the creel will be determined by the research carried on by the Institute for Fisheries Research and other research groups. There is another benefit to the fisherman which this research will not disclose; the local landowner's change in attitude towards the fisherman. The watershed program has caused the landowners to view the fisherman in a new light. Instead of someone to be ordered off the property, he is now given access to the stream. This is especially true when the stream has been fenced as a result of the project--the landowner has surrendered the land along the stream to the use of the fisherman.

The final accomplishment, and by far the most important, is the change in sentiment towards the rivers. Instead of taking the stream for granted and allowing its destruction for short range gains, there is now a community fund of good will developed towards the maintenance of a clear stream. The community leader groups have developed associations which can be reactivated at a future date if it becomes necessary to protect their resources, or to add further watershed protection. There have been several instances where work programs were reactivated on completed watershed projects.

These benefits will continue as long as the water flows in the streams, and trout live to excite the souls of fishermen.

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